ESTADO FINAL RESOLUCION DEL CONSEJO	FECHA	
Observaciones: _____		**1. APROBADO** **2. PENDIENTE** **3. RECHAZADO** **4. A FISCALIA**

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EVALUATION REPORT
CENTERS FOR ADVANCED RESEARCH

I. PROJECT INFORMATION

CENTER'S NAME **CENTER FOR ADVANCED INTERDISCIPLINARY RESEARCH IN MATERIALS (CIMAT)**
DIRECTOR **FERNANDO LUND**

II. EVALUATION PANEL

NAME	ORGANIZATION/ INSTITUTION	E-MAIL	SIGNATURE
Mauricio TERRONES	IPICYT, Mexico	mterrones@ipicyt.edu.mx	

III. PROGRAMS EVALUATION (please fill up as many forms as programs exist within the Center)

PROGRAM'S NAME
BIO-RELATED MATERIALS
PRINCIPAL INVESTIGATOR
ARIAS, J.L.

ITEM	Total/ Good	Partial/ Regular	Insufficient/ Deficient	Internal use
Degree of adoption of suggestions from the last report *	**X**			
Accomplishment of objectives and goals of the reported program		**X**		
Quantity of the results reached regarding the objectives and goals		**X**		
Quality of reached outcomes related to proposal objectives and goals	**X**			
Degree of integration with other ongoing programs of the Center	**X**			
Diffusion of the results	**X**			

PROGRAM'S NAME
MECHANICS OF COMPLEX MATERIALS
PRINCIPAL INVESTIGATOR
MELO, F.

ITEM	Total/ Good	Partial/ Regular	Insufficient/ Deficient	Internal use
Degree of adoption of suggestions from the last report *	**X**			
Accomplishment of objectives and goals of the reported program	**X**			
Quantity of reached outcomes related to proposal objectives and goals	**X**			
Quality of reached outcomes related to proposal objectives and goals	**X**			
Degree of integration with other ongoing programs of the Center	**X**			
Diffusion of the results	**X**			

***** If there had been none, please disregard this question

PROGRAM'S NAME CATALYSIS AND POLYMERIC MATERIALS
PRINCIPAL INVESTIGATOR QUIJADA, R.

ITEM	Total/ Good	Partial/ Regular	Insufficient/ Deficient	Internal use
Degree of adoption of suggestions from the last report *	X			
Accomplishment of objectives and goals of the reported program	X			
Quantity of the results reached regarding the objectives and goals	X			
Quality of reached outcomes related to proposal objectives and goals	X			
Degree of integration with other ongoing programs of the Center		X		
Diffusion of the results	X			

PROGRAM'S NAME INORGANIC MATERIALS
PRINCIPAL INVESTIGATOR SPODINE, E

ITEM	Total/ Good	Partial/ Regular	Insufficient/ Deficient	Internal use
Degree of adoption of suggestions from the last report *	X			
Accomplishment of objectives and goals of the reported program	X			
Quantity of the results reached regarding the objectives and goals		X		
Quality of reached outcomes related to proposal objectives and goals		X		
Degree of integration with other ongoing programs of the Center		X		
Diffusion of the results	X			

IV. CENTER EVALUATION

ITEM	Total/ Good	Partial/ Regular	Insufficient/ Deficient	Uso Interno
Degree of adoption of suggestions from the last report *	**X**			
Accomplishment of objectives and goals of the Center	**X**			
Quantity of reached outcomes related to proposal objectives and goals	**X**			
Quality of reached outcomes related to proposal objectives and goals	**X**			
Degree of integration between the programs of the Center		**X**		
Creation and reinforcement of international networks	**X**			
Outreach	**X**			
Diffusion of results	**X**			
Establishment and tasks of the Advisory Committee	**X**			

RECOMMENDATIONS **(see following concepts)**

☐	☒	☐	☐	☐	☐
APPROVE	APPROVAL WITH SUGGESTIONS	ADDITIONAL INFO.	PENDING	REJECT	FONDECYT USE

29	02	08

Evaluation Date

Signature reviewer

EVALUATION CONCEPTS
ANNUAL REPORT

1. Approve: The reviewer recommends to accept the report in its present form since he/she considers objectives and goals fully accomplished and all relevant issues covered by the report.

2. **Approval with suggestions or minor observations**

2.1 ***Minor observations*:** The reviewer recommends the approval of the report despite the justified incompleteness of some aspects that does not constitute an obstacle for the continuity of the Center activities.

2.2 ***Suggestions***: The reviewer recommends minor changes in order to improve the future performance of the Center.

3. A**dditional information:** The reviewer requires additional documentation or specific explanations to fully evaluate the report.

4. **Pending:** The reviewer makes significant observations to the report and conditions its approval to the accomplishment of specific demands.

5. **Reject:** The reviewer has strong objections to the contents of the report.

EVALUATION COMMENTS:

CIMAT has become an international well-know center in Materials Sciences. The direction and planning of the director has helped to improve the research quality at CIMAT. The overall results (all the programs) are impressive and far above the standards for Latin American Institutions (e.g. 3.23 articles/researcher per year, 2 patents in one year, 2 books in one year, etc.). CIMAT is a high profile Center and outstands in different areas of Materials Science. Therefore, CIMAT has accomplished their goals and objectives and it is desirable that further support is given so that **CIMAT continues to grow** (new faculty positions and students), **expand** (add new programs when appropriate), **and improve their facilities** (update equipment and obtain new state-of-the-art devices). Therefore, additional support should be provided for at least another five years. CIMAT should also start to look into ways of attract industries and external financial sources that could help its expansion and growth.

The report reflects the efforts at CIMAT and it is clear that the slope of the Center is positive and CIMAT is becoming well known internationally. However, in the process of improving the quality of the Center and in order to strengthen interdisciplinarity among the programs, some points still need to be addressed (see below).

Bio-Materials Program: In general the program has had a good and reasonable performance, but still needs additional support for reinforcing certain points that could be strengthen. For example the number of ISI publications. I recommend the researchers in this program to concentrate mainly in ISI at this stage. The number of students, especially PhD's also needs to be increased. I also note that more faculty members in this program are needed, and more hires should occur in the following years (at least one more for 2008). Although some multidisciplinary collaboration has taken place with the program in Mechanics and Complex Materials, additional collaborations with the other programs should be encouraged. I suggest some Bio-Materials seminars in addition to the existent seminars, and a school in Bio-materials and applications. I also believe that other biomineralization systems could be developed when new faculty within this program arrives at CIMAT. The production of some applied bio-materials should also be targeted and new links with industries in this area could start. I believe these actions will boost Bio-Materials further and could position CIMAT at the leading edge in this area if additional efforts take place.

Mechanics of Complex Materials: The productivity of this program is extremely good and the quality of published papers is excellent (papers in Science, Phys. Rev. Lett., Appl. Phys, Lett., etc.). In this program there is a good balance between students and researchers. The number of PhD students appears to be crucial in the program. However, the number of students in ISI publications is low. I recommend this program to include more graduate students in the ISI publications. This issue needs to be strengthened. This appears to be a very robust program and I mainly encourage the researchers involved to publish additional works and to promote interdisciplinary work with other programs at CIMAT. This will increase the number of publications of high quality and the international visibility of CIMAT.

Catalytic and Polymeric Materials: This program is also one of the most productive programs at CIMAT. The number of ISI publications is the highest and in addition, the

program has also two submitted patents. It is also important to note that the program has a significant number of PhD students, when compared to other programs. The program works nicely and the impact of the publications is high. As in the previous program, the papers should include the participation of more students and posdocs. Strong links with industry should be established in the program, in order to promote the creation of spin-off companies in which researchers have participation (mid term CIMAT project). This type of strategies could eventually provide additional resources to CIMAT.

Inorganic Materials: The program has the lowest number of ISI publications but also has the lowest number of researchers involved. The low productivity is also due to the lack of structural characterization of the new compounds made by the group. Therefore, researchers had to characterize the materials abroad. The efforts in working with undergraduate students of this program are clear and have been strengthened. However, the program needs also to enroll more PhD students able to carry out research work which could be eventually published in leading journals. I believe that additional faculty should be hired in this program in order to boost it. This program should also strengthen the multidisciplinary collaborations with other programs. This will also increase the number of products and would alleviate the fact that the number of researchers is not that high. I see this program as the less developed and the one that needs some planning and restructuring.

Crystallography Laboratory: This facility is of importance to Chilean Science. However, it was unfortunate to experience difficulties with the equipment during 2007. The facility has a good number of users but CIMAT should promote this facility to the Region and expand the use in other Latin American countries. There are already publications from the laboratory and this is an indicative of positive progress.

RECOMMENDATIONS TO THE CENTER DIRECTOR:
(only if report is approved))

The Center has developed nicely and it is leading in specific topics from different programs. The director (Dr. Lund) has carried out a significant effort in boosting high quality research, and attracting students to carry out research at an international level. The center is young but competitive at the international level, and further actions should be taken in to account in order to improve the competitiveness in research at the international level.

However, I still find that interdisciplinarity should be promoted among the different programs. The Center should try to attract more PhD students to carry out research and for this I suggest establishing an open day to invite possible students that could be enrolled in the future. In addition, publicity of the PhD programs should be offered to foreign students with the possibility of scholarships covered by CIMAT. This will provide more visibility at the Latin American and regional level. The possibility of having sandwich programs with other institutions is also desirable.

I also noted that additional Latin American members should be added to the Advisory Committee. I see many people from the US and Europe and not many from Latin American. In this context, CIMAT should try to establish stronger links and collaborations with other International Research Centers in Latin America.

The Inorganic Materials and the Bio-materials programs require additional boost and new hires should be made in 2008. It is important also to strengthen the collaborations among the programs and to device mechanisms to promote multidisciplinary research within CIMAT. Thesis Co-supervisions in multidisciplinary topics should be promoted as well as papers with students.

The Inorganic Materials and the Bio-materials programs should also organize special seminars to invite well-known researchers. These seminars will promote further interactions among CIMAT researchers, and this could also help to establish new collaborations with other institutions with an important exchange of students. In this way these programs will increase their productivity and impact.

CIMAT should continue organizing the Conferences every year. These have been very successful and I recommend that the next conferences are also in specific topics that are of current interest.

The interaction with companies should be reinforced. In addition, the director should look into some planning considering the creation of spin-off companies at CIMAT with additional benefits to the researchers involved.

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Observaciones: _____		**1. APROBADO** **2. PENDIENTE** **3. RECHAZADO** **4. A FISCALIA**

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EVALUATION REPORT
CENTERS FOR ADVANCED RESEARCH

I. PROJECT INFORMATION
CENTER'S NAME **CIMAT**
DIRECTOR Fernando Lund

II. EVALUATION PANEL

NAME	ORGANIZATION/ INSTITUTION	E-MAIL	SIGNATURE
Carmen Huber	US National Science Foundation	chuber@nsf.gov	Carmen Huber

III. PROGRAMS EVALUATION (please fill up as many forms as programs exist within the Center)

PROGRAM'S NAME **Bio-Related Materials**
PRINCIPAL INVESTIGATOR **J. L. Arias**

ITEM	Total/ Good	Partial/ Regular	Insufficient/ Deficient	Internal use
Degree of adoption of suggestions from the last report *		X		
Accomplishment of objectives and goals of the reported program		X		
Quantity of the results reached regarding the objectives and goals		X		
Quality of reached outcomes related to proposal objectives and goals			X	
Degree of integration with other ongoing programs of the Center		X		
Diffusion of the results		X		

PROGRAM'S NAME **Mechanics of Complex Materials**
PRINCIPAL INVESTIGATOR **F. Melo**

ITEM	Total/ Good	Partial/ Regular	Insufficient/ Deficient	Internal use
Degree of adoption of suggestions from the last report *	X			
Accomplishment of objectives and goals of the reported program	X			
Quantity of reached outcomes related to proposal objectives and goals	X			
Quality of reached outcomes related to proposal objectives and goals	X			
Degree of integration with other ongoing programs of the Center	X			
Diffusion of the results	X			

***** If there had been none, please disregard this question

PROGRAM'S NAME **Catalysis and Polymeric Materials**				
PRINCIPAL INVESTIGATOR **R. Quijada**				
ITEM	**Total/ Good**	**Partial/ Regular**	**Insufficient/ Deficient**	**Internal use**
Degree of adoption of suggestions from the last report *	X			
Accomplishment of objectives and goals of the reported program	X			
Quantity of reached outcomes related to proposal objectives and goals	X			
Quality of reached outcomes related to proposal objectives and goals	X			
Degree of integration with other ongoing programs of the Center	X			
Diffusion of the results	X			

PROGRAM'S NAME **Inorganic Materials**				
PRINCIPAL INVESTIGATOR **E. Spodine**				
ITEM	**Total/ Good**	**Partial/ Regular**	**Insufficient/ Deficient**	**Internal use**
Degree of adoption of suggestions from the last report *	X			
Accomplishment of objectives and goals of the reported program		X		
Quantity of reached outcomes related to proposal objectives and goals	X			
Quality of reached outcomes related to proposal objectives and goals		X		
Degree of integration with other ongoing programs of the Center	X			
Diffusion of the results	X			

IV. CENTER EVALUATION

ITEM	Total/ Good	Partial/ Regular	Insufficient/ Deficient	Uso Interno
Degree of adoption of suggestions from the last report *	X			
Accomplishment of objectives and goals of the Center	X			
Quantity of reached outcomes related to proposal objectives and goals	X			
Quality of reached outcomes related to proposal objectives and goals	X			
Degree of integration between the programs of the Center	X			
Creation and reinforcement of international networks	X			
Outreach	X			
Diffusion of results	X			
Establishment and tasks of the Advisory Committee	X			

RECOMMENDATIONS **(see following concepts)**

	APPROVE	APPROVAL WITH SUGGESTIONS	ADDITIONAL INFO.	PENDING	REJECT	FONDECYT USE
		XX				

April 14, 2008
Evaluation Date

Carmen Huber
Signature reviewer

EVALUATION CONCEPTS
ANNUAL REPORT

2. Approve: The reviewer recommends to accept the report in its present form since he/she considers objectives and goals fully accomplished and all relevant issues covered by the report.

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2.2 ***Suggestions***: The reviewer recommends minor changes in order to improve the future performance of the Center.

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4. **Pending:** The reviewer makes significant observations to the report and conditions its approval to the accomplishment of specific demands.

5. **Reject:** The reviewer has strong objections to the contents of the report.

EVALUATION COMMENTS:

1. Research Programs:

a. Bio-related materials: The program addresses questions of fundamental interest which straddle the biological and physical sciences. The first two questions/hypotheses addressed by this group are interrelated, of fundamental relevance, and generally in line with the group's expertise. The third question is more oriented towards biomedical applications, a very competitive field, and would benefit from contributions by investigators beyond CIMAT.

While the questions addressed are current and interesting, progress towards answering them is not commensurate with a rather mature, eight-year effort. There is some evidence of increased output in publications, yet most of them (7/12) are domestic or are part of proceedings of international conferences or symposia, and as such do not meet the higher standards of archival journals. There are two publications in a published "Handbook of Biomineralization", which attest to international recognition of the researchers' contribution to the overall field but, as is usually the case with book contributions, do not convey the urgency or excitement that journal articles do. It is telling that the three publications that appear to be in peer-reviewed journals involve authors who are not part of this group, and in this sense interactions with other programs within CIMAT and with other researchers in Chile has helped some, but not enough.

This program has resulted in development of an important physical characterization infrastructure. However, lack of substantive expertise in the physical sciences and of access to the analytical, quantitative tools the latter can bring to bear on the problems addressed have prevented this group from meaningful advances towards answering the fundamental questions being posed. This must be addressed by the CIMAT leadership if this group effort is to result in meaningful scientific contributions in the next two years and, certainly, if it is to continue beyond CIMAT's current lifetime.

b. Mechanics of Complex Materials: This effort builds on a long tradition and internationally recognized strength in the areas of non-equilibrium and complex systems. The investigators have not only capitalized on their expertise and knowledge in somewhat established systems such as granular materials, where they made important contributions that resulted in publications in high impact international journals, but also, under Prof. Melo's leadership, have started to examine phenomena in biological systems where the experimental, computational and theoretical expertise within the group can address the fundamental physical phenomena underlying the behavior observed in such systems. This is especially true for the studies of the mechanical behavior of biological matter, where the tools available to condensed matter physicists and materials scientists have made significant contributions to the field recently, as well as for the studies of surface growth and biomaterials (for the latter, respective linking with the groups of Christine Orme at Lawrence Livermore

National Lab and of Ka-Yee Lee at U. of Chicago in the USA should be considered).

Overall, this is a very strong group effort which has contributed substantially to CIMAT's international recognition. CONACYT should consider developing mechanisms for this effort to continue beyond CIMAT's current lifetime.

c. Catalysis and Polymeric Materials: This effort brings an engineering component into CIMAT and has contributed much to the Center, both in fundamental as well as applied science and engineering aspects. The group members have also worked well with and contributed to the progress of the bio-related materials group, and are to be commended for this. In this regard, the passing of Dr. Retuert represents a significant loss for CIMAT. The work of this group has not only resulted in archival publications but also in domestic and international patents. Their work on blends from recycled materials, including biological materials, appears especially novel and interesting. While much work has already been done on polymer-clay nanocomposites worldwide, the group has made novel contributions to their processing.

This is also a very strong group effort. Its continuation beyond CIMAT's current lifetime should be seriously considered.

d. Inorganic Materials: This group addresses three topical areas: materials with catalytic properties, materials with magnetic properties, and polymetallic systems. The effort on materials with magnetic properties has resulted in several publications on the synthesis of magnetic complexes, yet lacks the necessary connections to materials aspects and their characterization to make a substantial impact on the field. The efforts on catalytic materials and on polymetallic systems leverages the existing expertise in other groups within CIMAT and, at the same time, brings synthetic expertise to those groups . These two efforts are just starting to produce results; they should be encouraged and enhanced, with an outlook towards merging them with other group effort within CIMAT.

This group is to be commended for their efforts in the education and training of students, who may turn out to be the investigators in a future equivalent of CIMAT. This fulfills a very important requirement within CIMAT's mission.

e. Crystallography Laboratory: This laboratory is an important element of CIMAT's contribution to Chile's research infrastructure. The laboratory is also a valuable resource for other investigators in South America.

3. Education and Training of Students

There are many undergraduate and graduate thesis in progress and/or completed. CIMAT has also instituted an undergraduate research program, which will help attract students to scientific careers in areas of interest to CIMAT. In this sense, CIMAT's contribution to a human research infrastructure is good. On the other hand, the participation of students in CIMAT's publications is somewhat less than expected for an effort of this magnitude and should be encouraged further.

4. Networking and Outreach

CIMAT has implemented mechanisms for internal networking within the Center (shared experimental facilities and annual retreats), for networking with other researchers both within Chile and abroad (organizing and hosting international workshops, seminars and short courses), and for reaching out to the student population and the Chilean public at large (undergraduate internships, science exhibits). This is a very strong aspect of CIMAT and Prof. Lund and his colleagues in CIMAT are encouraged to continue these activities. The CIMAT-International Copper Association initiative reserves special mention, as it is a testimony to the international respect and recognition that CIMAT receives.

5. Administration

Profs. Lund and Quijada have implemented a collegial and effective management structure. CIMAT's External Advisory Committee is composed of internationally recognized researchers. The Committee has met routinely and has provided very useful advice to CIMAT. The CIMAT leadership has listened to and implemented the recommendations of the External Advisory Committee. CIMAT's management is very good.

SUMMARY

Overall, CIMAT has done very well, especially considering the complex nature of this effort, which not only cuts across disciplinary boundaries but also involves multiple institutions. As noted by CIMAT in its internal analysis, this complexity brings along numerous challenges, not only scientific but also managerial. It is to the credit of CIMAT's participants and its leadership that they have overcome those challenges and created a multi-institutional, interdisciplinary center that can become an overall umbrella for materials research and education efforts in Chile, and serve as a model for integrating efforts in other areas of science and engineering.